

INTERACTIVE WORD WALLS

Transforming Content Vocabulary Instruction

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Velocity
Friction
Acceleration

Kinetic Energy

Motion

Speed

Words are the foundation of knowledge. They are powerful tools used to express ideas, communicate with others, access prior knowledge, and learn new concepts. Research shows a strong relationship between student word knowledge and academic achievement (Stahl and Fairbanks 1986). As a result, building academic content vocabulary is an important part of science instruction. As with most students, English language learners (ELLs) benefit when vocabulary instruction is contextually rich and cognitively demanding (Cummins 1996). Contextually rich instruction builds basic language comprehension through the use of context clues that include authentic pictures, illustrations, diagrams, graphic organizers, and interactive learning experiences. Cognitively demanding instruction requires students to simultaneously process different types of information.

Husty and Jackson (2008) reported that students who are ELLs achieved a deeper understanding of science concepts and enhanced their knowledge of science-related vocabulary when they were guided through inquiry-based, multisensory explorations that repeatedly exposed them to keywords, used visual clues, and used definitions in context. One example of visual clues for vocabulary development is the use of an interactive word wall. Such visual presentation of material can be extremely beneficial, as stated by a sixth-grade ELL student: “The word wall helps a lot

because it can be a reference and I learn from seeing stuff so the pictures really help.” One study reported that scores on high-stakes tests increased across all student groups when teachers used interactive word walls and provided opportunities for students to encounter and use science vocabulary in authentic and engaging ways (Jackson and Ash 2011).

Many middle school classrooms have traditional word walls displaying unorganized lists of vocabulary students have encountered in class (see Figure 1).

Word walls are designed to serve as visual scaffolds and are a common classroom tool used to support reading and language arts instruction. To support vocabulary development in science and support students who are ELLs, Husty and Jackson (2008) created interactive word walls that resemble semantic maps (Masters, Mori, and Mori 1993). Semantic maps are graphic organizers that help students identify important ideas and how those ideas fit together. They visually showcase relationships among concepts and may also be referred to as web or concept maps. An interactive word wall, as opposed to the traditional word wall, provides visual aids that assist in illustrating word meanings and conceptually organize words to deepen understanding. These word walls usually include a visual representation of the word along with a vocabulary label. Definitions are optional. In this article, we describe our efforts to implement interactive word walls at a middle school in central Texas.

FIGURE 1 Traditional science word wall

Good, better, and best word walls

Posting lists of words that are aligned with current instruction is a good beginning. However, the teaching potential of word walls increases when student-generated material and visual supports (including black-line pictures [pictures drawn with black ink or pencil] or cartoons) are arranged to illustrate relationships among words and organize learning. The most effective word walls include photographs or the actual item (realia). Teachers may also include visual artifacts from inquiry-based science activities to help students remember the learning activities and to connect labs with scientific concepts. This process supports deeper understanding of science because it provides opportunities for students to interact with the objects on display. Cambourne (2000) asserted that student interaction with classroom wall prints and displays supports literacy and learning for all students. Therefore, student participation in creating and maintaining word walls is crucial. Teachers can create a balance between teacher-directed and student-driven instruction by enlisting students' help in specific ways. Students can supply realia, prepare labels and definitions, create illustrations, and suggest ways in which concepts are related. Figure 2 contains an example of a student-generated illustration depicting kinetic energy.

A rubric that we use to guide word-wall construction and structure teacher reflection is shown in Figure 3. This rubric outlines the steps needed to transform

FIGURE 2 Student-generated illustration

a traditional word wall, which is generally a list of words, into a powerful interactive teaching tool that involves students, organizes content, and better supports learning.

Student perceptions of word walls

When sixth- and eighth-grade students were asked to describe how interactive word walls supported their learning, the overwhelming majority of students not only said that they were better than traditional or standard word walls, but many identified ways in which the word walls helped them. For example, one student stated that the word wall “helped me because whenever I forget I could just look back and it gave me good information.” Additionally, students stated that it “helps remind us of what we have learned” and “since it is always up there I always remember.” One student also valued the visual support: The “word wall helps me by giving me a visual understanding.” Finally, students indicated that the way the words were

FIGURE 3 Interactive word-wall rubric

Good	Better	Best
Academic vocabulary is posted.	Academic vocabulary is posted.	Academic vocabulary is posted.
Words are aligned with current instruction.	Words are aligned with current instruction.	Words are aligned with current instruction.
Words are visible from a distance.	Words are visible from a distance.	Words are visible from a distance.
	Words are arranged to illustrate relationships and organize learning.	Words are arranged to illustrate relationships and organize learning.
	Wall may contain student-generated material. (The teacher may or may not give students the opportunity to participate.)	Wall contains student-generated material.
	Visual supports are black-line pictures or cartoons.	Visual supports are color pictures, photographs, or actual items (realia).

first identify words that meet the criteria above by reviewing the essential content vocabulary and verbs included in our state's science student expectations. Then we study the vertical alignment of content vocabulary set forth in our district's science curriculum. Finally, we identify terms included in student expectations, science process skills, high-frequency words students might know or have used in a different context, and common words that may challenge ELLs. For example, we include brief definitions and many connecting words, such as "is made up of," "occurs in the," and "states that."

The next step is to pair selected words with pictures. As much as possible, we use the actual item or photographs instead of clip art or drawings because photos and realia support contextually rich instruction. Pictures need not be elaborate. Their purpose is to help students (especially those who are ELLs) make quick and easy visual

connections to vocabulary. Words and pictures/realia are then arranged on sheets of paper. Once essential vocabulary and phrases are identified and matched with pictures/realia, we sketch a concept map to organize content and connect the vocabulary. Completed sketches become blueprints for the word walls. This process organizes information within a unit, just as a graphic organizer would. Additionally, the classroom word wall becomes a unit organizer that students can easily reference to help them organize content and support vocabulary development as the unit progresses.

Selecting words and building the wall

Organizing the word-wall display is the most time-consuming part of the process. Interactive word walls require planning. Because they build schema for individual terms through the use of images and manipulatives while showcasing connections between terms in a unit or lesson, teachers need to organize the information themselves before they can present it and involve students. Choosing terms for an interactive word wall is not necessarily easy. Words that appear on interactive word walls usually include a mix of content-specific vocabulary and high-frequency words that influence speaking, reading, and writing (Beck, McKeown, and Kucan 2002).

We have developed a specific process for the development of effective interactive word walls. We

organized on the word wall was important: "I like the word wall because it helps me remember which order [the words] go in and the definition." Another student stated, "They helped me with picture definitions and the order that they go in helped me a lot."

Once teachers have selected vocabulary and have an idea of how specific concepts are linked, they are ready to build the wall with their students. Many teachers plan and structure instruction around the construction of the word wall. They strategically introduce new terminology while connecting the words to previously established terms during instruction. Some teachers build sections of the wall from scratch with each class, whereas other teachers prefer to build the wall with their first period and then reference it throughout the day. One teacher built pieces

FIGURE 4 Hanging word wall

of her wall the afternoon before she needed to use it. This allowed her to be precise and creative with its construction and was more convenient because it was placed in a location that required her to use a stepladder. Another teacher taped big pieces of colored butcher paper together and hung the giant poster from her ceiling with wire, string, and clothespins. (Be sure to check local building fire regulations before suspending or stringing items from classroom ceilings. Students should not be allowed to get on tables or chairs to help hang the word walls.) She also used colored masking tape to connect the vocabulary words and different-colored paper to highlight connecting phrases. If arrows were needed, she drew them on the masking tape with a marker.

Wall space and room arrangement often determine the configuration and placement of word walls. Word walls can be arranged on cupboard doors or classroom walls, or hung from the ceiling with wire and string (see Figure 4). Maximum instructional potential and efficiency are achieved when interactive-word-wall construction is aligned with lessons and

students are allowed to participate in the process. As a result, walls are usually built over many days and are finished as a unit nears completion. Word walls support units and are changed or replaced as units change. They are covered during quizzes and summative tests.

Formative assessment

Leno and Dougherty (2007) proposed that teachers formatively assess ELL students' understanding of vocabulary by "observing students' responses to questions and usage of key concepts during class discussions ... as well as their ability to use key concepts in both oral and written expressions" (p. 66). Word walls are a reliable resource that ELLs may reference in their efforts to apply English vocabulary when participating in or listening to classroom discourse, as well as

when asked to read or write about science content. One ELL student reported, "The word wall helped me remember things I had forgotten, like every day I would look at the information so it helped me remember." Another ELL student stated, "If I forget something and I need a reminder on an activity I can look at the word wall."

Challenges

The most challenging part of the interactive-word-wall process is finding time to plan and sketch the concept map and locate appropriate photographs to go with the words. It can be difficult to find unique and distinctive pictures to represent every term. For example, while "speed" and "velocity" can be differentiated by finding a way to visually acknowledge that velocity includes direction, coming up with a simple picture for "acceleration" that distinguishes it from "speed" and "velocity" can be difficult. Also, making the word wall interactive for students can be logistically difficult. One teacher uses Velcro tape to move words on and off the word wall with each class as she

progresses through the school day. Deciding when and how to rotate word walls is also challenging. Wall space is a factor in most science rooms, making it difficult to display multiple word walls simultaneously. Finally, certain science topics are easier to work with than others. However, given these challenges, many teachers still believe it is well worth the effort, and they make time to plan and implement interactive, multisensory science word walls.

Conclusion

Multisensory, interactive word walls provide an overview of each lesson and, upon completion, an overview of the unit, as well (see Figure 5). Teachers who implemented interactive word walls found that it made organizing unit instruction easier and focused planning meetings. Furthermore, interactive word walls are useful to students not only in unifying related terms, but also in helping students understand connections. Moreover, students became more self-sufficient during activities and labs, finding information they needed by looking at the word wall rather than asking the teacher. ■

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FIGURE 5 Completed word wall at end of unit



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